

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE MATHEMATICS

F

Foundation Tier Paper 2 Calculator

Monday 6 November 2017

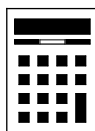
Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
TOTAL	

Advice

- In all calculations, show clearly how you work out your answer.



Please note that these worked solutions have neither been provided nor approved by AQA and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

Anything written in green in a cloud doesn't have to be written in the exam.

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

Answer **all** questions in the spaces provided

- 1 How many minutes are there in $2\frac{1}{4}$ hours?

Circle your answer.

[1 mark]

135

145

215

225

 $2\frac{1}{4} \times 60 = 135$. To get the mixed fraction, press SHIFT then the fraction button on the left

There are 60 minutes in an hour so multiplying the number of hours by 60 converts it into minutes

- 2 Which of these numbers is **half** of a square number?

Circle your answer.

[1 mark]

1

2

3

4

$1 \times 2 = 2$
 $2 \times 2 = 4$
 $3 \times 2 = 6$
 $4 \times 2 = 8$

Multiplying each of the numbers by 2, as this is the opposite of halving, to see if it gives a square number. 4 is a square number as it is 2^2

- 3 Circle the value of the digit 3 in the number 17.03

[1 mark]

$\frac{3}{10}$

$\frac{1}{30}$

$\frac{3}{100}$

$\frac{1}{300}$

The 3 is in the hundredths place



4 The value of A is double the value of B .

Circle the correct formula.

[1 mark]

$$A = B + 2$$

$$A = 2B$$

$$A = \frac{B}{2}$$

$$A = B^2$$

$$A = 2 \times B$$

5 (a) Simplify $y \times y$

[1 mark]

Answer

$$y^2$$

y is multiplied by itself so it is squared

5 (b) Simplify $5a + 2 - a + 9$

[2 marks]

Collecting the like terms. $5a - a = 4a$. $2 + 9 = 11$

Answer

$$4a + 11$$

Turn over for the next question

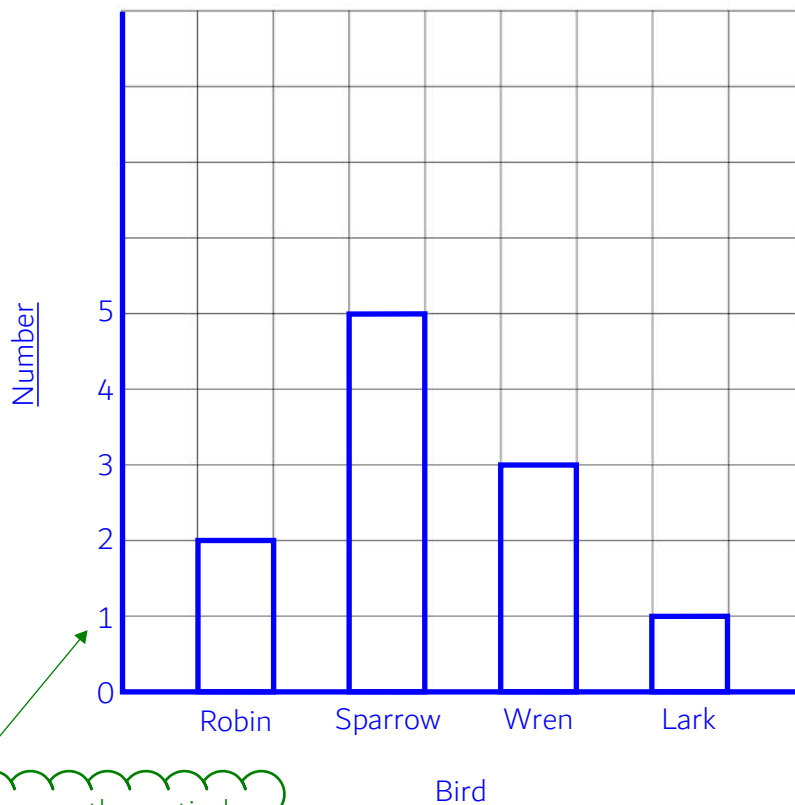


6 The table shows information about the birds in a garden.

Bird	Number
Robin	2
Sparrow	5
Wren	3
Lark	1

Draw a bar chart to show the information.

[3 marks]



There are 9 boxes to use on the vertical scale and this needs to represent a maximum number of 5. $5/9 = 0.5$ so this is rounded up to a suitable scale of going up in 1s



7

Eve has these coins.



Ola has these coins.

Eve gives **three** of her coins to Ola.

Now, Ola has the same amount of money as Eve.

Which coins does Eve give to Ola?

[3 marks]

The amount of money Eve has

The amount of money Ola has

$$(2+1+0.50+0.20+0.20+0.05+0.02) - (1+0.50+0.02+0.01)$$

2

Subtracting the amount of money Ola has from the amount of money Eve has works out the difference. Halving this works out that Eve needs to give £1.22 so that they have the same amount of money

Answer £1 , 20p , 2p

Turn over for the next question

Turn over ►



8 A dry cleaning shop has the following offers.

Suit



Normal price £12.50
1st suit normal price
2nd suit half price

Dress



Normal price £9.75
Three for the price of two

Work out the **total** price for 2 suits and 6 dresses.

[4 marks]

$$\underline{1\frac{1}{2} \times 12.50 + 4 \times 9.75}$$

Adding the price of 2 suits and 6 dresses works out the total price

The price of 2 suits. The first suit is 1 lot of the normal price and the second suit is $\frac{1}{2}$ a lot of the normal price. $1 + \frac{1}{2} = 1\frac{1}{2}$ lots of the normal price

The price of 6 dresses. 6 dresses is 2 lots of 3 so the offer can be used twice. 2 are paid for each time the offer is used so $2 \times 2 = 4$ times the normal price

Answer £ 57.75



9 Karl has twin sisters.

The sum of the ages of Karl and his twin sisters is 39

In 4 years' time the twins will be 18

How old will Karl be in 4 years' time?

[3 marks]

$$39 - (18 - 4) \times 2 + 4$$

In 4 year's time the twins will be 18 so $18 - 4$ works out how old they currently are. Multiplying this by 2 as there are 2 twins works out the total age of the twins. Subtracting this from 39 works out Karl's current age. Adding 4 works out his age in 4 years' time

Answer _____ 15 _____

Turn over for the next question



10 One of the angles in a triangle is 60°

Tick a box for each statement.

	Must be true	Cannot be true	Might be true
The triangle is equilateral			✓
The triangle has at least one other acute angle	✓		
The triangle is right-angled			✓
The other two angles are each less than 60°		✓	

[4 marks]

The triangle could be equilateral (all angles and sides are the same) as there are 180° in total in a triangle, $180/3 = 60$, so each angle would need to be 60° and the other two angles could be 60° as well.
It is not certain as the other angles might not be 60°

The triangle must have at least one other acute angle as if the other two angles were not less than 90° there would be more than 180° in total and triangles only have 180° .

The triangle could be right-angled as if one angle is 60° and another is 90° (a right angle), the other would be 30° as $180 - 60 - 90 = 30$.

The other two angles cannot be both less than 60° as there wouldn't be 180° in total in the triangle



11 Which of these numbers has **exactly** two factors?

Circle your answer.

[1 mark]

6

7

8

9

6 has 1, 6, 2, 3. 7 has 1, 7. 8 has 1, 8, 2, 4. 9 has 1, 9, 3

12 Work out $\sqrt{7.5^2 + 18^2}$

Circle your answer.

[1 mark]

19.5

25.5

331.5

380.25

13 (a) Use your calculator to work out the exact value of $\frac{18\,953 \times 437}{11}$

[1 mark]

Answer 752951

13 (b) Use approximations to 1 significant figure to check if your answer to part (a) is sensible.

[3 marks]

$$\frac{20000 \times 400}{10}$$

800000

Yes ← 752951 is relatively close to 800000 so it is sensible



14 Chris sells lawnmowers.

The table shows the number he sold each quarter for three years.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
2016	17	64	50	5	$= 136$
2015	9	72	61	1	$= 143$
2014	19	58	53	2	$= 132$
	45	194	164	8	

14 (a) In which year did he sell the most lawnmowers?

You **must** show your working.

[2 marks]

136 were sold in 2016. 143 were sold in 2015. 132 were sold in 2014.

Answer

2015

14 (b) He uses the table to decide the number of lawnmowers to stock each quarter.

At the **start** of which quarter should Chris stock the most lawnmowers?

Circle your answer.

[1 mark]

Quarter 1

Quarter 2

Quarter 3

Quarter 4

As the most are sold during Quarter 2



15

In a test,

Section A has 80 marks

Section B has 120 marks.

Riya scores

55% in Section A

70% in Section B.

To pass, Riya needs to score 65% of the **total** marks.

Does she pass?

You **must** show your working.**[4 marks]**

$$55\% \times 80 + 70\% \times 120 = 128$$

To get the percentage symbol in the calculator, press SHIFT then the ANS button

55% of the 80 marks add 70% of the 120 marks works out that she scored 128 marks in total. 'Of' means to multiply

$$65\% \times (80 + 120) = 130$$

80 + 120 works out how many marks there are in total. Doing 65% of this works out that 130 marks are needed to pass

130 marks are needed to pass and Riya only scored 128 marks so she did not pass

Answer _____

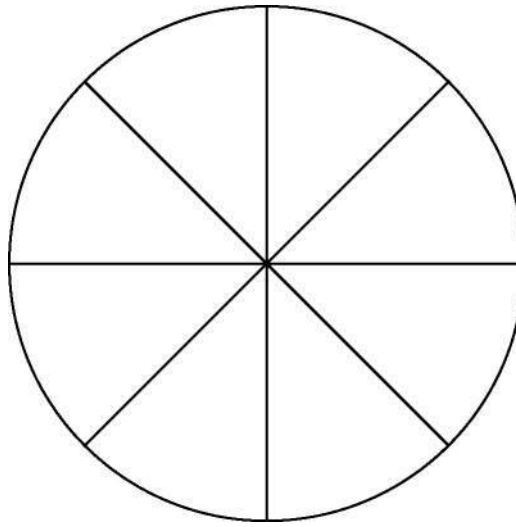
No

Turn over ►



16

A wheel is made of a circular rim and 8 spokes as shown.

Not drawn
accurately

The length of each spoke is 37 cm

Work out the **total** length of the rim and spokes.**[3 marks]**

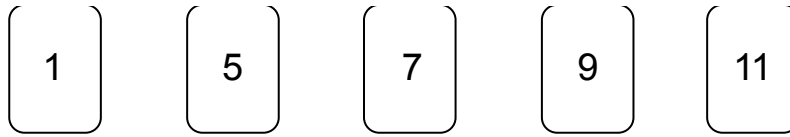
$$37 \times 8 + \pi \times 37 \times 2$$

The length of the 8 spokes

The length of the rim. It is the circumference of the circle. Circumference = $\pi \times$ diameter.
Diameter = $2 \times$ radius. The length of each spoke is the radius

Answer 528.5 cm

18 Here are five cards.



One of the cards is removed.

The mean of the numbers on the remaining four cards is 6

Which card was removed?

You **must** show your working.

[3 marks]

$$m^t n$$

Mean = total/number. Writing this as a formula triangle

$$1+5+7+9+11-6 \times 4$$

Subtracting the total of the remaining cards from the total of all of the cards leaves the value of the card which was removed

The total of all of the cards

The total of the remaining cards. From the formula triangle, total = mean x number. The mean is 6 and the number of remaining cards is 4

Answer

9



19 (a) Divide 120 in the ratio 1 : 4

[2 marks]

$$\frac{120}{1+4}$$

1 + 4 works out how many parts there are in total. This many parts represents the 120 so dividing 120 by this works out the value of 1 part

$$24 \times 4$$

1 part is worth 24. Multiplying this by 4 works out the value of the 4 parts

Answer 24 : 96

19 (b) Write the ratio 7 : 4 in the form $n : 1$

[1 mark]

To make an equivalent ratio, all sides of the ratio need to be multiplied or divided by the same amount. 4 was divided by 4 to get 1 so the 7 needs to be divided by 4

Answer $\frac{7}{4}$: 1

Turn over for the next question



20

In 2015, Han was paid £1350 per month.

In 2016, he

had a 2% increase in his monthly pay

worked 37.5 hours per week

worked for 47 weeks.

Work out Han's average pay **per hour** for 2016

[5 marks]

$$\frac{1350 \times \frac{100+2}{100} \times 12}{37.5 \times 47}$$

Pay per hour for 2016 means pay for 2016 divided by the number of hours worked. $100 + 2$ works out the percentage the monthly wage rises to. Dividing this by 100 converts it into a fraction which when the £1350 is multiplied by increases it by 2%. Multiplying the monthly pay in 2016 by 12 as there are 12 months in a year so this works out the total pay for 2016. 37.5×47 works out the number of hours worked in 2016

£9.375... is rounded to the nearest penny

Answer £

9.38



- 21 An experiment is carried out 200 times.
The possible outcomes are K, L and M.

21 (a) Complete the table.

[2 marks]

Outcome	K	L	M
Frequency	84	54	62
Relative frequency	0.42	$\frac{54}{200}$	$\frac{62}{200}$

The relative frequency can be left as a fraction of the amount of times each outcome happened

$$200 - 84 - 54 = 62$$

Subtracting the frequency of K and L from the number of times the experiment was carried out must leave the frequency of M

- 21 (b) Altogether, the experiment is carried out 500 times.

How many times would you expect the outcome to be K?

[2 marks]

$$500 \times 0.42$$

The relative frequency is the proportion of the times each outcome happened. We can assume that the relative frequency will stay the same for more experiments. Doing this proportion of the 500 times works out an estimate of the number of times K will happen

Answer 210

Turn over for the next question

Turn over ►



22 The table shows information about the UK and Germany.

	Population		Area (square miles)	
UK	64 000 000	÷	95 000	= 674
Germany	82 000 000	÷	140 000	= 586

$$\text{Population density} = \frac{\text{population}}{\text{area}}$$

Compare the population densities of the UK and Germany.

[3 marks]

Greater for UK

23 Which **one** of the following is discrete data?

Circle your answer.

[1 mark]

Mass of a television

Time taken to deliver a television

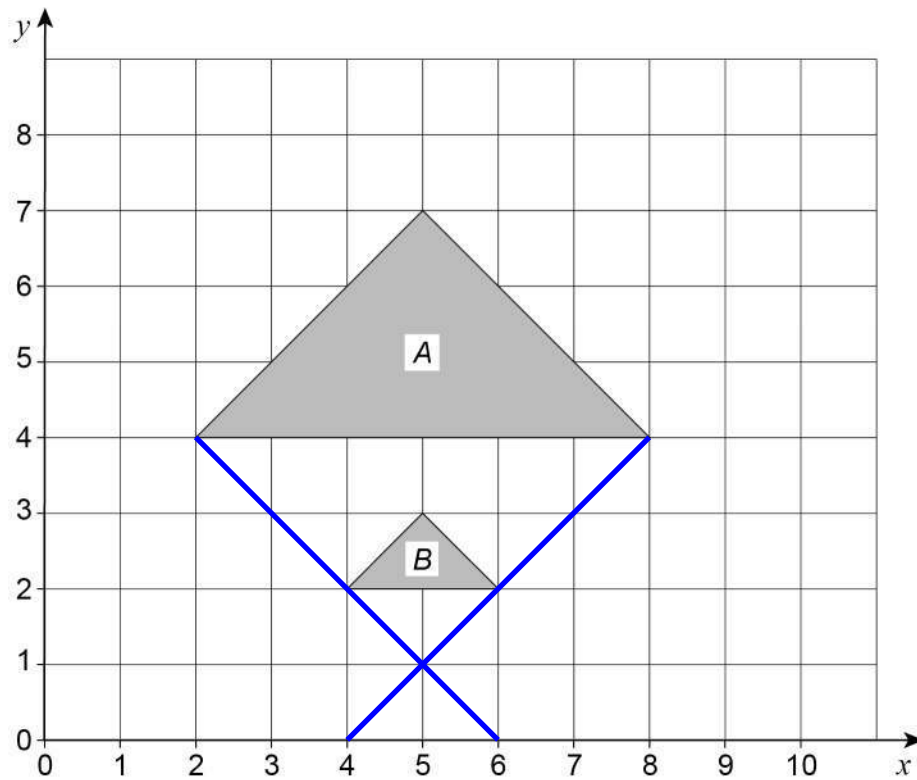
Height of a television mast

Number of televisions sold

Discrete data can only be certain values. It cannot be any value. Number of televisions sold can only be whole numbers



24

Describe fully the **single** transformation that maps triangle *A* to triangle *B*.**[3 marks]**

Enlargement, scale factor $\frac{1}{3}$, centre $(5, 1)$

Turn over for the next question

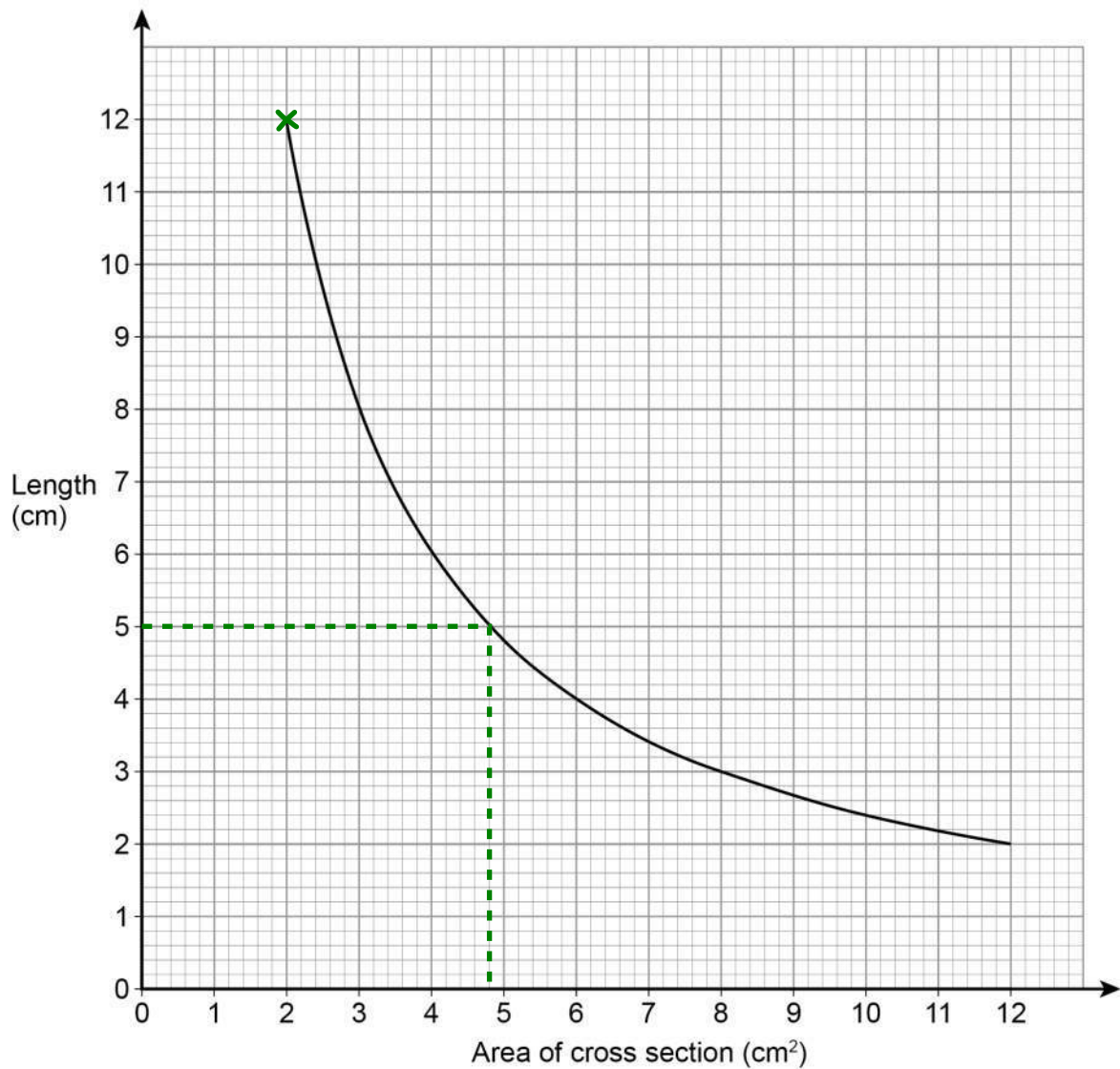
It is an enlargement as it has changed size. The scale factor is $\frac{1}{3}$ as the sides are $\frac{1}{3}$ of the size on B and the shape is the same way up. Drawing lines through the corners of both shapes then finding where they cross works out the centre of enlargement

Turn over ►



25

The graph shows information about prisms with the same volume.

25 (a) Give **one** example to show the volume is 24 cm^3

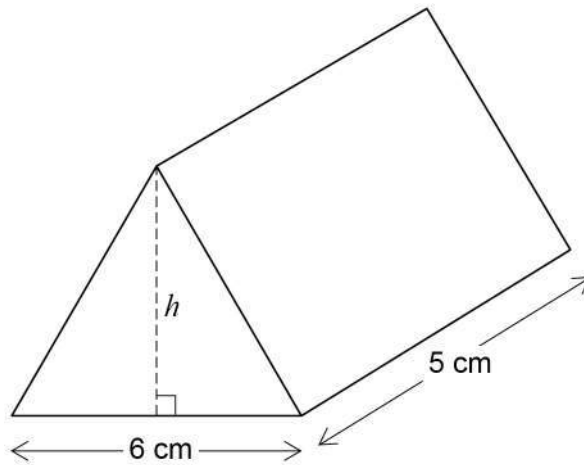
[1 mark]

$$2 \times 12 = 24$$

Volume of prism = area of cross section \times length. At the cross indicated, the area of cross section is 2 and the length is 12



- 25 (b) The diagram shows a prism with volume 24 cm^3
The height of the triangular cross section is h .



Work out the height, h .

[3 marks]

$$\frac{1}{2} \times 6 \times h = 4.8$$

From the graph, a prism with volume 24 cm^3 and length 5 cm has an area of cross section of 4.8 cm^2 . The cross section is a triangle and area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$. The base is 6 cm and the height is h

$$h = \frac{4.8}{\frac{1}{2} \times 6}$$

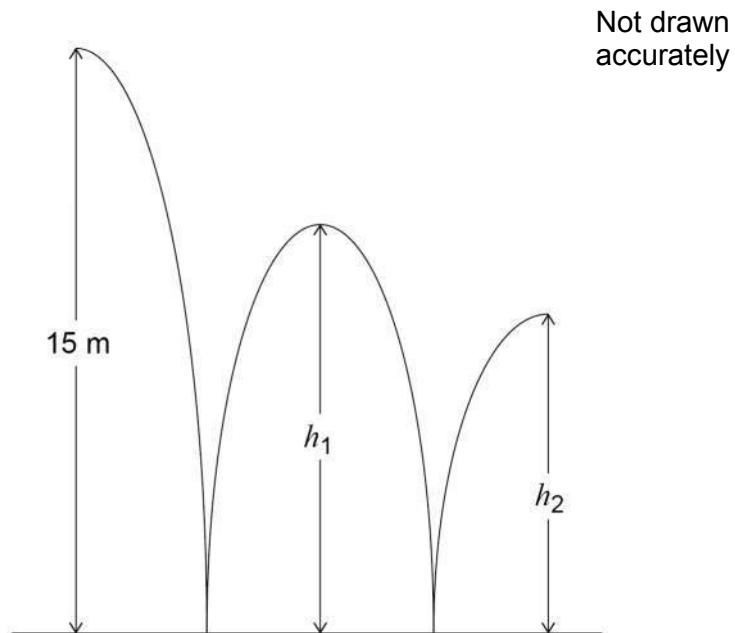
Rearranged to make h the subject by dividing both sides by $(\frac{1}{2} \times 6)$

Answer 1.6 cm

Turn over for the next question



- 26** A ball is thrown from a height of 15 metres.
It bounces to height h_1 , then to height h_2 as shown.



h_1 is three quarters of the original height.

- 26 (a)** Jack expects h_2 to be three quarters of h_1

Work out the value of h_2 that he expects.

[2 marks]

$$\frac{3}{4} \times \frac{3}{4} \times 15$$

$\frac{3}{4} \times 15$ works out $\frac{3}{4}$ of 15m, which is h_1 . Doing $\frac{3}{4}$ of this by multiplying by $\frac{3}{4}$ works out h_2

Answer 8.4375 metres



26 (b) In fact, h_2 is two thirds of h_1

How does this affect the answer to part (a)?

Tick a box.

The ball bounced higher than he expected

The ball bounced lower than he expected

Show working to support your answer.

[2 marks]

$$\frac{2}{3} \times \frac{3}{4} \times 15 = 7.5$$

$\frac{3}{4} \times 15$ works out $\frac{3}{4}$ of 15m, which is h_1 . Doing $\frac{2}{3}$ of this by multiplying by $\frac{2}{3}$ works out h_2

7.5m is less than the 8.4375m he expected

Turn over for the next question



27

Solve $4(3x - 2) = 2x - 5$

[3 marks]

$$12x - 8 = 2x - 5$$

Expanding the bracket

$$10x - 8 = -5$$

Subtracting $2x$ from both sides to get the x terms on the side with the most x

$$10x = 3$$

Adding 8 to both sides to get the x term on its own

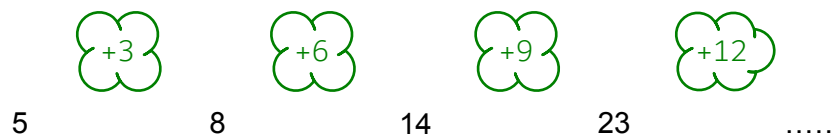
$$x = \frac{3}{10}$$

Dividing both sides by 10 makes x the subject and finds x

28

Work out the next term of this quadratic sequence.

[2 marks]

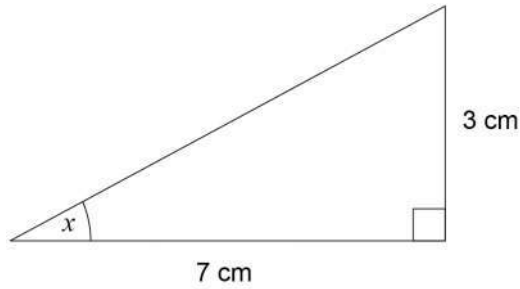


The amount added increases by 3 each time

Answer 35



29

Work out the size of angle x .Not drawn
accurately

[2 marks]

S^Ó H C ^Á H T ^Ó Á

Right angled trigonometry can be used. Ticking O as we have the opposite and A as we have the adjacent. There are two ticks on TOA so this formula triangle can be used

$\tan^{-1}\left(\frac{3}{7}\right)$

Covering T, which stands for tan of the angle, works out that \tan of the angle = opposite/adjacent. Doing the inverse tan of both sides gives angle = $\tan^{-1}(\text{opposite/adjacent})$. The opposite is 3cm and the adjacent is 7cm

Answer 23.2 degrees

END OF QUESTIONS

